Influence of artificial aging on the stir cast al6061-sic metal matrix composites under different aging conditions

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Abstrak

The present work aims to improve the microstructure and hardness related properties of age hardened Al6061-SiC reinforced composites produced by a two stage stir casting method. Three composites with 2, 4, and 6wt. % (35-40μm) of SiC reinforcement are subjected to microstructural examination and hardness test at different locations to analyse the uniform distribution of the reinforcements in the matrix. As-cast composites are solution-treated at 558°C, followed by an aging treatment conducted at 100, 150, and 200°C, during which peak hardness values are noted. The peak aged samples are subjected to hardness and wear tests. In line with the objectives, ranges from 80-100% and 120-145% additional increase in hardness values are observed over as-cast alloy during the aging treatment conducted at 100, 150 and 200°C, respectively. Lower temperature aging shows substantial improvement in hardness and wear resistance over high temperature aging in each respective group. Also higher weight percentages of reinforced composites show excellent wear resistance, due to the presence of eroded iron particles from the counter surface which is regarded as a beneficial effect during the wear test. The presence of SiC particles provides more sites for the nucleation of fine precipitates. These fine precipitates hinder the movement of dislocation and thus increases hardness as well as wear resistance after the precipitation hardening treatment.